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## EUROPEAN PATENT APPLICATION

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(71) Applicant: TORVERK TORSBY VERKSTADS  
AKTIEBOLAG  
S-685 24 Torsby (SE)

(72) Inventor: Sundberg, Lars  
685 32 Torsby (SE)

(74) Representative: Hynell, Magnus  
Hynell Patenttjänst AB,  
Patron Carls väg 2  
683 40 Hagfors/Uddeholm (SE)

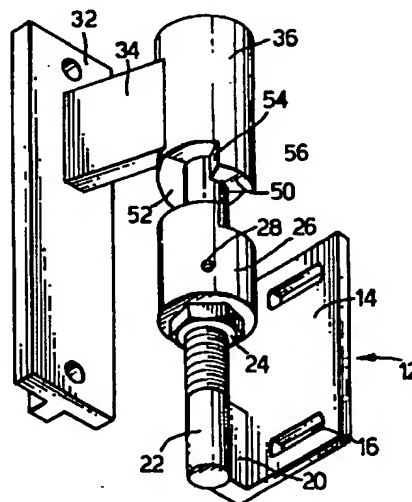
### (54) A door or port hinge

(57) The present invention relates to a door or port hinge means (10) having a stationary part (12) which includes a sleeve (26), a moveable part (30) which includes a sleeve (36), and a rod (22) which functions to mutually connect the sleeves (26, 36) and which forms the rotational centre of said moveable part. The invention is characterized in that the end surface of each sleeve has disposed around its periphery

- two planar, essentially horizontal first surfaces (50);
- two cam surfaces (52) which adjoin the first surfaces (50) at a given angle thereto;
- two planar second surfaces (54) which adjoin the cam surfaces (52) and which are essentially parallel with the first surfaces (50);
- and two third surfaces (56) which are located between the first and second surfaces in adjointment therewith and which extend perpendicular to the first surfaces (50);

wherein the sleeve surfaces abut corresponding surfaces on the second sleeve in a closed non-raised position such that during a given part of the opening movement the respective cam surfaces (52) of the sleeves will slide on one another and therewith lift the port; and wherein the planar first surfaces (50) of said sleeves slide on one another during the remainder of said opening movement.

Fig.2.



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## Description

### FIELD OF INVENTION

The present invention relates to a vertical hinge for folding doors and side hung doors in industrial buildings for instance.

### DESCRIPTION OF THE BACKGROUND ART

In order to obtain and maintain a good indoor climate, it is important to provide effective sealing of door and window openings, especially in heated industrial buildings. Cold draughts through cracks are liable to impair the function of an existing ventilation system. Even slight cold air draughts can disturb the laminar air flow created in a room by a ventilation system due to the ingress of cold and heavier air, ie the air is unable to flow in a manner that is favorable from a comfort aspect, and draughts and a poorer indoor climate are the result.

It is known to fit draught preventing lip seals to the bottom edges of doors. In order for these seals to be effective, they must lie against the underlying surface/floor under pressure. They are thereby subjected to wear as the door is opened and closed and therefore have a short useful life.

The use of rising hinges is also known, ie hinges in which a moveable hinge part is able to move upwards as it swings around the stationary hinge part. Such rising hinges are not suitable for use with heavy industrial ports, because of the considerable surface pressures and lateral reaction forces that would be generated as a result of uneven loading of the hinge.

DE-B-26 41 684 teaches a rising hinge for lightweight doors, wherewith a successively increasing abutment pressure is generated between bevelled surfaces on both parts of the hinge. The smallest surface abutment and therewith the greatest pressure between the bevelled surfaces occurs in a fully open position, which increases the risk of permanent deformation of the surfaces.

DE-B-24 13 117 also teaches a hinge with which the abutment pressure is greatest in a fully open position. This hinge arrangement is mainly intended to enable height setting to be adjusted and adapted to door and window frames.

Because the abutment surfaces of both the hinges taught by the aforesaid documents are solely at one point which lies to one side of the rotational centre of the hinge the hinge will be unevenly loaded, which may be acceptable in the case of light doors and windows but which is totally unacceptable in the case of large industrial ports.

### DESCRIPTION OF THE INVENTION

According to one aspect of the present invention the object is to provide hinge means which will raise a door or port during part of a door or port opening move-

ment and to maintain the door or port at this raised level during the remainder of said opening movement. This object is achieved with a door or port hinge means that has a stationary part which includes a sleeve, a moveable part which includes a sleeve, and a rod which functions to mutually connect said sleeves and which forms the rotational centre of said moveable part, characterized in that the end surface of each sleeve has disposed around its periphery

- two planar, essentially horizontal first surfaces;
- two cam surfaces which adjoin the first surfaces at a given angle thereto;
- two planar second surfaces which adjoin the cam surfaces and which are essentially parallel with said first surfaces ;
- and two third surfaces which are located between the first and second surfaces in adjoinment therewith and which extend generally perpendicular to the first surfaces;

wherein the sleeve surfaces abut corresponding surfaces on the second sleeve in a closed non-raised position such that during a given part of the opening movement the respective cam surfaces of said sleeves will slide on one another and therewith lift the port; and wherein the planar first surfaces of said sleeves slide on one another during the remainder of said opening movement.

This aspect and other aspects of the invention will be evident from the following description of a preferred embodiment and from the following claims.

### BRIEF DESCRIPTION OF THE DRAWINGS

A preferred embodiment of the invention will now be described with reference to the accompanying drawings, in which

- Figure 1 is a perspective view of a right-hung inventive hinge means in non-raised (closed) state;
- Figure 2 is a perspective view of the hinge means according to Fig. 1 and shows the hinge means in a slightly separated state;
- Figure 3 illustrates the vertical mantle surface of an outwardly extended lower sleeve part;
- Figure 4 shows an end surface of a sleeve part from above; and
- Figure 5 illustrates the manner in which the surfaces of the sleeves move in relation to one another as the hinge rotates.

### DESCRIPTION OF A PREFERRED EMBODIMENT

The inventive hinge means is identified generally in Figs 1 and 2 by the reference numeral 10. The hinge means includes a lower part 12 that has an adjuster plate or mounting plate 14 which is intended to be

mounted on a wall adjacent the port opening. The plate 14 has an elongated aperture 16 which allows lateral adjustment of the plate 14. The front side of the plate is provided on its edge 18 that lies proximal to the port opening with an attachment/spacer element 20 which is angled in relation to the plate. Mounted on the attachment element 20 is a rod 22 which is threaded along at least a part of its length and which extends parallel with the front edge 18 of the plate. An adjuster nut 24 is fitted on the threaded part of the rod 22. Located above the nut 24 is a sleeve, hereinafter referred to as the lower sleeve 26. The upwardly facing end surface of the lower sleeve 26 has a special configuration which will be described in detail further on. The lower sleeve 26 includes locking means 28 in the form of a through-penetrating hole and a locking screw for securing the position of the lower sleeve 26 in relation to the rod 22.

The upper part 30 of the hinge means includes a mounting plate 32 which is meant to be mounted on the rear edge of a door or port. This mounting plate 32 is also provided with an attachment/spacer element, here referenced 34, which is angled in relation to the plane of the plate at an angle of about 45°. The attachment element carries a sleeve 36, hereinafter referred to as the upper sleeve, wherein the bore 38 of said sleeve extends parallel the side edges 40 of the mounting plate. The diameter of the bore 38 is essentially the same as the diameter of the rod 22. The downwardly facing end surface of the upper sleeve 36, as seen in Fig. 1, also has a special profile configuration, which will be described in more detail below and which corresponds to the profile of the upwardly facing end surface of the lower sleeve 26.

The profiles of the upper and lower sleeves have the following configuration. It will be seen from Fig. 3, which shows the outwardly extended mantle surface of the lower sleeve, and from Fig. 4, which shows the sleeve from above, that the end surfaces include an essentially planar first surface 50 which extends through a given length of arc and then merges with a flank or cam surface 52 at a given angle in relation to the planar first surface. The cam surface 52 merges with an essentially planar second surface 54 which is longer than the first surface 50 and which has a length of arc that in the illustrated embodiment corresponds essentially to the length of arc of the upper surface 50. The second surface 54 merges with an essentially vertical surface 56 which adjoins a second upper surface such that the end surfaces of the sleeves have two times the described surfaces. The sleeve of the upper part has a corresponding profile.

When fitting the hinge means, the mounting/adjuster plate 14 on the lower hinge part is mounted on the aforesaid wall and positioned so that the rod 22 extends generally parallel with the door opening. The upper hinge part 30 is fitted to the door. The door is hung so that the rod 22 on the lower hinge part will pass into the bore of the upper sleeve 36. The lower sleeve 26 is not locked in this position, but is rotated so that the

upper planar surfaces 50 of one sleeve will lie in abutment with the lower planar surfaces 54 of the other sleeve, and vice versa, Fig. 5a. The door is then closed and its height adjusted with the aid of adjuster nuts 24. When the door is closed, the lower sleeve 26 is locked to the rod 22 with the aid of the locking means 28 and the sleeves are in the aforescribed positions.

Subsequent to adjusting the position of the door, the door will be raised by the relative rotation of the sleeves 26, 36 as the door is opened, with the cam surfaces sliding on one another, Fig. 5b. Because the sleeves have two cam surfaces disposed diametrically on both sides of the rotational centre, the hinge will not be loaded unevenly as the door is opened. Furthermore, the abutment pressure will be smaller than in the case of conventional rising hinges because abutment occurs at two points instead of one. After having rotated through a given angle of rotation, the sleeves will slide against one another through the medium of the upper planar surfaces 50, Fig. 5c. Uneven loading is also avoided in this case, because each sleeve has two diametrically disposed surfaces similar to the cam surfaces 52.

As a result of this construction of the surfaces of the rising sleeves a relatively fast rising effect is obtained with a relatively small rotational opening movement, which means that the sealing strip will be subjected to the minimum of wear against the floor surface. The planar upper surfaces 50 function so as to render it unnecessary to hold an open port in place as in the case of hinges that have sloping surfaces for the whole of the opening movement, and also to distribute the abutment pressure over a wider area when the port is open, wherewith wear on the surfaces will be less than in the case of conventional rising hinges. The vertical surfaces 56 function to produce a pronounced stop and prevent further relative movement between the hinge parts when a predetermined closing position has been reached. The extension of the cam surfaces 56, ie their pitch and peripheral extension, is dependent partly on the sleeve material and partly on the desired raising speed. A peripheral extension of between 35 and 45° is preferred, while the pitch of each cam surface will preferably be between 37 and 41 degrees in comparison to the planar surfaces 50 and 54.

It will be understood that the invention is not restricted to the described and illustrated embodiment and that modifications can be made within the scope of the following claims. For instance, the door and frame/wall mountings may have many different forms. The hinge means can also be reversed so that rod and the adjuster nut are seated on the moveable part.

#### Claims

1. Door or port hinge means (10) having a stationary part (12) which includes a sleeve (26), a moveable part (30) which includes a sleeve (36), and a rod (22) which functions to mutually connect said

sleeves (26, 36) and which forms the rotational centre of said moveable part, characterized in that the end surface of each sleeve has disposed around its periphery

- two planar, essentially horizontal first surfaces (50);
- two cam surfaces (52) which adjoin the first surfaces (50) at a given angle thereto;
- two planar second surfaces (54) which adjoin the cam surfaces (52) and which are essentially parallel with said first surfaces (50); and two third surfaces (56) which are located between the first and second surfaces in adjunction therewith and which extend perpendicular to the first surfaces (50);

wherein the sleeve surfaces abut corresponding surfaces on the second sleeve in a closed non-raised position such that during a given part of the opening movement the respective cam surfaces of said sleeves will slide on one another and therewith lift the port; and wherein the planar first surfaces (50) of said sleeves slide on one another during the remainder of said opening movement.

2. Hinge means according to Claim 1, characterized in that the surface of respective pairs are disposed diametrically on both sides of the rotational centre of said rod.
3. Hinge means according to Claim 1, characterized in that the position of one of the sleeves (26) along the rod (22) can be changed with the aid of setting means (24) for setting the starting position between the relative rotatable hinge parts.
4. Hinge means according to Claim 3, characterized in that the setting means includes a screw thread along at least part of the rod and an adjustable nut coating therewith.
5. Hinge means according to Claim 3, characterized in that the sleeve (26) includes locking means (28) which allows the sleeve (26) to be rotated around the rod (22) for adjustment of the mutually rotatable hinge parts to a starting position and which functions to lock said parts to the rod when the desired position has been attained.
6. Hinge means according to Claim 1, characterized in that each cam surface (52) on each sleeve extends circumferentially through an angle of between 35 and 40°.
7. Hinge means according to Claim 6, characterized in that the cam surface (52) on each sleeve has a pitch of between 37 and 41°.

8. Hinge means according to Claim 1, characterized in that the first and second planar surfaces (50, 54) on each sleeve include circumferentially an arc of between 65 and 75°.

9. Hinge means according to Claim 1; characterized by a stationary part (12) that includes a mounting plate (14) which has a horizontally extending aperture (16) and which is intended to be mounted adjacent a port opening; an attachment element (20) affixed to the mounting plate and carrying an at least partially threaded rod (22); a lower sleeve (26) fitted on the rod (22); a moveable part (30) which includes a mounting plate (32) intended to be mounted on a door; an attachment element (34) affixed to the attachment (34) and carrying an upper sleeve (36) which is intended to be placed on said rod (22), said rod forming the rotational centre of said moveable part, wherein the end surface of each sleeve has disposed peripherally therearound

- two planar, essentially horizontal first surfaces (50);
- two cam surfaces (52) which adjoin the first surfaces (50) at a given angle thereto;
- two planar second surfaces (54) which adjoin the cam surfaces (52) and which are essentially parallel with said first surfaces (50); and two third surfaces (56) which are located between the first and second surfaces in adjunction therewith and which extend perpendicular to the first surfaces (50);

wherein the sleeve surfaces abut corresponding surfaces on the second sleeve in a closed non-raised position such that during a given part of the opening movement the respective cam surfaces of said sleeves will slide on one another and therewith lift the port; and wherein the planar first surfaces (50) of said sleeves slide on one another during the remainder of said opening movement.

10. Hinge means according to Claim 9, characterized in that a nut (24) is placed on the threaded part of the rod (22) for changing the position of the lower sleeve (26), and thus also the position of the door, in relation to the mounting plate (14) of the stationary part and thus the opening.
11. Hinge means according to Claim 9, characterized in that the lower sleeve (26) is rotatable relative to the rod (22) and is provided with locking means (28) which allows the sleeve (26) to be rotated around the rod (22) for adjustment of the mutually rotatable hinge parts to a starting position and which functions to lock said parts to the rod when the desired position has been attained.

Fig.1.

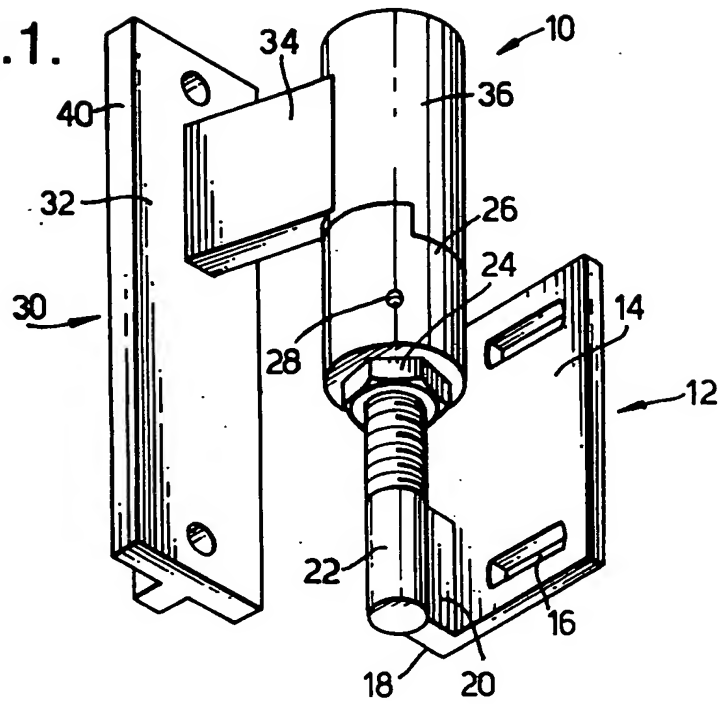


Fig.2.

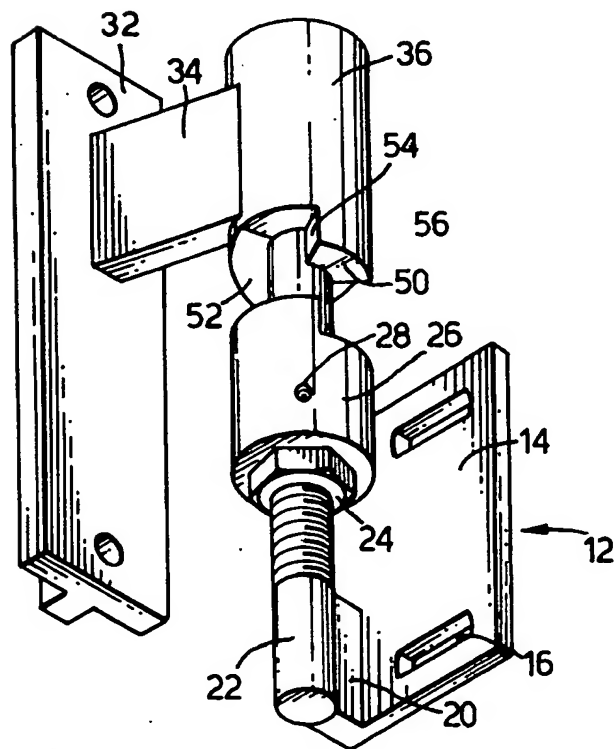


Fig.3.

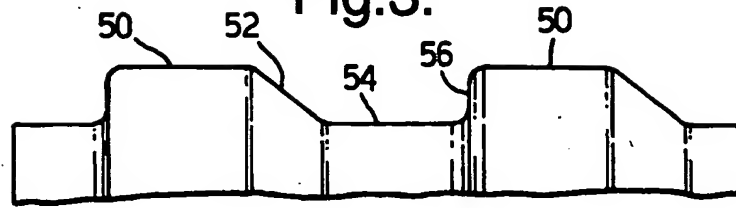


Fig.4.

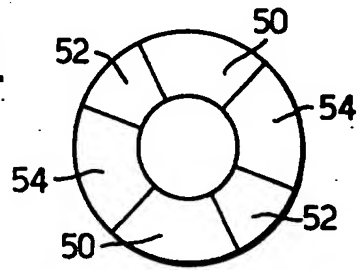


Fig.5a.

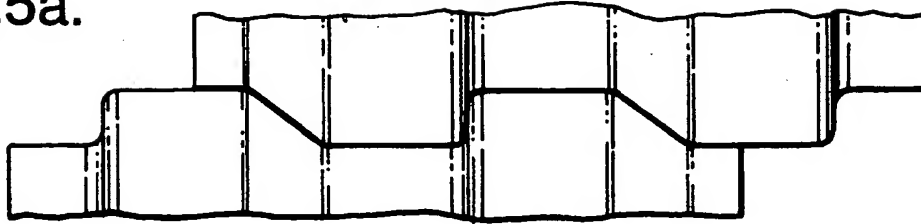


Fig.5b.

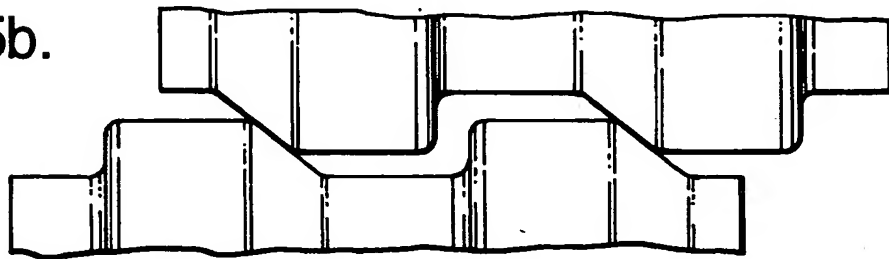
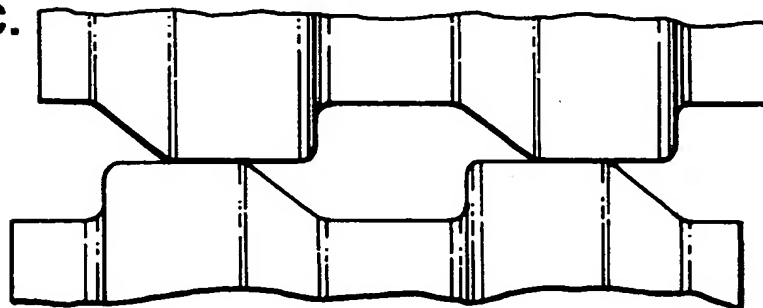


Fig.5c.





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# EUROPEAN SEARCH REPORT

Application Number  
EP 96 20 3239

DOCUMENTS CONSIDERED TO BE RELEVANT			
Category	Citation of document with indication, where appropriate, of relevant passages	Relevant to claim	CLASSIFICATION OF THE APPLICATION (Int.Cl.6)
X	DE 85 36 576 U (NADOR)	1	E05F1/06
Y	* page 3 - page 6; figures *	2,3,5,9,10	
Y	FR 2 313 529 A (SCHUCO) * figure 1 *	2	
Y	DE 36 38 384 A (BESCHMANN) * column 4, line 10 - line 22; figures *	3,5	
Y	DE 295 09 466 U (STEINBACH & VOLLMANN) * page 4 - page 6; figures *	9,10	
A	US 4 697 306 A (RHODES) * figures 8,9 *	9	
A	US 1 341 690 A (WERNER) * the whole document *	9	
			TECHNICAL FIELDS SEARCHED (Int.Cl.6)
			E05F E05D
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 7 March 1997	Examiner Van Kessel, J
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